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The Informational and Non-Informational Compositions of UK Fund Managers' Dynamic Herding in the Stock Market

Summary: This paper examines whether UK fund managers engage in herding behaviour in the stock market using the dynamic herding measure, whether their herding behaviour is different during bullish and bearish periods, whether most of their herding is informational, which types of informational reasons act as the main drivers of their herding and whether there are non-informational drivers of their herding. Our results reveal that UK fund managers engage in significant herding behaviour and that this behaviour does not differ significantly from bullish to bearish stock markets. Moreover, we confirm that there are weak positive correlations between fund managers' herding and stock returns within the subsequent year, which indicates that their herding is mainly informational. To improve portfolio performance, other investors could follow UK fund managers and purchase stocks overbought by them with at least 15 traders quarterly in the following one-year period, particularly for growth-type, sector-specific and international-type funds. Moreover, because they are more likely to herd in large-capitalisation securities, the informational reasons driving managers' herding behaviour are mainly related to investigative herding. We also find that growth-type and international-type funds are more likely to herd with similar-type funds. This finding may result from reputational and characteristic herding, which illustrates that non-informational reasons for managers' herding still exist.

Key words: Investigative herding, Reputational herding, Characteristic herding, Mutual fund, UK.

JEL: C21, G11, G14, G21.

Based on the dominance of mutual funds from western countries in the stock market, the influence of fund managers trading stocks in these countries on stock prices is significantly greater than that of other investors. UK mutual funds account for the highest proportion of European mutual funds, and their fund managers are dedicated to data collection, analysis and professional investment. This phenomenon makes their stock selection strategies and trading behaviours more rational and informative than those of other investors. Nonetheless, as a result of information asymmetry and agency problems, mutual funds sometimes follow their counterparts' behaviours with regard to certain securities (Russ Wermers 1999). This so-called "herding" behaviour of fund managers in the stock market amplifies stock price volatility and drives prices away from fundamentals (Andreas Walter and Friedrich M. Weber 2006). In sum,

we investigate the following five issues. First, using the dynamic herding measure of Richard W. Sias (2004), this study examines whether UK fund managers engage in herding behaviour in the stock market. Second, we examine whether this herding behaviour changes depending on the nature of the market as bullish or bearish. Third, we examine whether the herding behaviour of UK fund managers is informational by investigating whether their post-herding returns are positive. Fourth, we rely on Wermers (1999) and Sias (2004) and investigate whether herding is stronger in larger capitalisation or smaller capitalisation securities to determine which informational reasons (investigative herding vs. information cascades) are primarily responsible for herding behaviour in UK fund managers. Finally, we analyse whether there are non-informational reasons (such as characteristic herding and reputational herding) for their herding behaviour. This study clarifies this issue by examining whether UK fund managers are more likely to herd with similar-type funds than their different types. None of these issues have been addressed in any detail in the previous literature.

1. Literature Review

1.1 Empirical Studies of Static LSV Herding Measure

Josef Lakonishok, Andrei Shleifer, and Robert W. Vishny (1992) developed a metric to measure herding behaviour (the LSV measure), which has since become standard in the herding literature. Mark Grinblatt, Sheridan Titman, and Wermers (1995) use the LSV measure to find evidence of herding by managers in US mutual funds by focusing on stocks traded in large numbers by managers during a given period. Tsai-King Liao, Chih-Jen Huang, and Chieh-Yuan Wu (2011) employ the buying and selling herding measures in a trading sample of US funds to find that fund managers are more likely to herd when they sell stocks that investors view optimistically. Fotini Economou, Alexandros Kostakis, and Nikolaos Philippasa (2011) use European countries as their sample and reveal herding in the Greek and Italian stock markets but find only mixed evidence for herding in Portugal. Since managers of UK mutual funds cannot engage in short sales, Sam Wylie (2005) employed the LSV measure adjusted for biases to examine herding among UK fund managers, and their empirical results reveal fund manager herding in the largest and smallest individual UK stocks but little herding in other stocks.

1.2 Empirical Studies and the Theoretical Basis of Dynamic Herding Measure

The static LSV herding measure, which indirectly tests for cross-sectional dependence, results in the highest number of institutional traders on one side of the trade within that period. By contrast, Sias (2004) tested the cross-sectional correlation between institutional investors' trades in one period and other institutional investors' trades in the immediately subsequent period to directly examine whether institutional investors follow each other's trades. In other words, the dynamic measure of Sias (2004) redefined herding as a group of institutional investors buying and selling the same stocks by following each other's transactions. Unlike the adjusted LSV measure developed by Wylie (2005) that functions on a semi-annual basis, this study ex-

tends the Sias (2004) model to use cross-sectional correlations of the fraction of UK fund managers increasing their positions over adjacent quarters to investigate whether these managers are engaged in herding behaviour. The cross-sectional correlation between the fractions of fund managers buying over adjacent quarters can be directly decomposed into the portion resulting from an individual fund manager following his own trades and the portion resulting from fund managers following the trades of other fund managers. Hence, the first objective of this paper is to apply the dynamic herding measurement developed by Sias (2004) to analyse whether UK mutual fund managers are engaged in significant herding behaviour in order to compare our results with relevant findings for the US and emerging markets.

1.3 Are Fund Managers' Herding Behaviours Similar during Bullish and Bearish Market Periods?

Bullish and bearish stock market periods are the most dynamic financial market environments faced by mutual fund managers. Most studies, such as those by Eric C. Chang, Joseph W. Cheng, and Ajya Khorana (2000), Kimberly C. Gleason, Ike Mathur, and Mark A. Peterson (2004) and Riza Demirer, Ali M. Kutan, and Chun-Da Chen (2010), have verified the conclusion that investors' herding behaviour was more significant in bearish markets than in bullish markets. By contrast, in addition to Soosung Hwang and Mark Salmon (2004), who argued that herding behaviour characterises both bearish and bullish stock market periods, Walter and Weber (2006) found that the level of buy-side herding is higher in a bull market. Nonetheless, due to the nature of short-selling restrictions for mutual funds, the second objective of this paper is to examine whether this restriction significantly diminishes fund managers' herding behaviour in a bearish market period relative to a bullish market period, or whether the prohibition against short selling for mutual funds reduces the expansion of their herding behaviours in a bearish market period that result from their quick response to negative news so as to create similar herding behaviours in both bullish and bearish market periods.

1.4 Is Fund Managers' Herding Informational by Examining Their Post-Herding Returns?

Timur Han Gür, Naci Canpolat, and Hüseyin Özel (2011) demonstrate that the herding behaviour of institutional speculators might have been one reason leading to the recent financial crisis. A number of previous studies have demonstrated the price effects of institutional herding, but institutional herding has different price impacts (such as Wermers 1999; Patrick J. Dennis and James Weston 2000; Sugato Chakravarty 2001; Sias, Laura T. Starks, and Titman 2002; Sias 2004; Yang-Cheng Lu, Hao Fang, and Chien-Chung Nieh 2012; Thomas C. Chiang et al. 2013; Fang et al. 2013). Grinblatt, Titman, and Wermers (1995) and Sias (2004) showed that institutional herding is weakly positively correlated with future returns. However, Wei-Feng Hung, Chia-Chi Lu, and Cheng F. Lee (2010) proposed that if information for institutional herding is impounded into security prices, then there are no price reversals resulting from institutional herding (such as Bradford J. De Long et al. 1990;

Grinblatt, Titman, and Wermers 1995; Hyuk Choe, Bong-Chan Kho, and René M. Stulz 1999; Wermers 1999; Sias 2004). Moreover, the results of Stephanie Kremer and Dieter Nautz (2013) indicate that institutional buying herding significantly increases cumulative returns over the complete time horizon. Lu, Fang, and Nieh (2012) empirically find that the herding behaviour of foreign institutions positively affects stock prices in an emerging stock market. Chiang et al. (2013) indicate that dynamic herding is positively related to stock returns and that the herding phenomenon across markets is positively correlated. However, the empirical results of Dennis and Weston (2000), Chakravarty (2001) and Sias, Starks, and Titman (2002) indicate that the subsequent returns of institutional herding from fads, reputational herding or characteristic herding are significantly reversed. Fang et al. (2013) propose that the positive price impact of institutional investors buying herding patterns depends on their preferences for higher turnover or larger-size stocks. In other words, if institutional herding behaviour occurs for non-informational reasons, such herding may drive return reversals in post-herding periods. Hence, the third objective of this paper is to examine whether the post-herding returns of UK mutual fund and separate fund-type managers are positive in order to determine whether their herding behaviour is primarily informational or non-informational in nature.

1.5 Informational Reasons for Fund Managers' Herding (Informational Cascades vs. Investigative Herding)

Theoretical models of herding have provided the rationales for why institutional investors might follow each other's trades, and these rationales include informational cascades, investigative herding, characteristic herding and reputational concerns (Wermers 1999; Sias 2004; Hung, Lu, and Lee 2010). Hung, Lu, and Lee (2010) further classify these causes of institutional herding by the existence of informational reasons or not. If institutional herding behaviour results from informational reasons (i.e., informational cascades and investigative herding), such trading behaviour may lead to positive effects on prices, which generate efficient stock prices. Alternatively, if institutional herding behaviour arises from non-informational reasons (such as from preferences for in certain firm- or industry-specific characteristics or from reputational concerns), such herding behaviour may drive stock prices away from fundamental values, which will lead to subsequent return reversals. However, Hung, Lu, and Lee (2010) only propose the theoretical causes of institutional herding but do not empirically examine them. Therefore, this study separately examines both the informational and non-informational causes of institutional herding based on the argument developed by Hung, Lu, and Lee (2010), thus filling a gap in the literature on institutional herding.

In terms of informational reasons for institutional herding, they generally include informational cascades and investigative herding. Abhijit V. Banerjee (1992) and Sushil Bikhchandani, David Hirshleifer, and Ivo Welch (1992) posited that informational cascades occur when institutional investors ignore their own noisy information and trade with the herd because they are inferring information from other trading behaviour. In such a situation, their action choice is generally also uninformative to later observers. Kenneth A. Froot, David S. Scharfstein, and Jeremy C. Stein

(1992) and Hirshleifer, Avanidhar Subrahmanyam, and Titman (1994) proposed that investigative herding arises when the information of institutional investors is positively cross-sectionally correlated, possibly resulting from following the same signals. Wermers (1999) asserted that informational cascades are more likely to occur in small-capitalisation securities, while investigative herding is more likely to occur in large-capitalisation securities. Thus, the fourth objective of this paper is to examine whether herding by UK mutual fund managers in the stock market results from informational cascades or investigative herding when such herding mainly results from informational causes.

1.6 Non-Informational Reasons for Fund Managers' Herding (Characteristic Herding and Reputational Herding)

The non-informational reasons for institutional herding include characteristic herding and reputational concerns. Diane Del Guercio (1996) and James A. Bennett, Sias, and Starks (2003) indicated that if institutions favour stocks with the same characteristics and if those preferences differ across institutional classes (i.e., characteristic herding) they tend to be more likely to follow similar rather than different types of institutions. These authors proposed that differences in the environments faced by different types of institutional investors may influence the likelihood that these investors herd and that herding occurs only within classifications or when some types of institutions may lead other types of institutions. Fang, Lu, and Hwey-Yun Yau (2014) show that positive cascades of foreign institutions focus on the winner and small-sized stocks but that negative cascades centre on the largest net purchases of stocks. Liao, Huang, and Wu (2011) reveal that investor sentiment plays an important role in explaining consecutive mutual fund herding, particularly on the sell-side. Scharfstein and Stein (1990), Brett Trueman (1994) and Sias (2004) contend that institutional investors should exhibit the strongest tendency to herd with similar types of institutional investors because of reputational herding. The herding behaviours of different types of mutual funds can be regarded as those of different types of institutional investors. Because of reputational concerns, mutual funds strongly tend to herd with similar-type funds with whom they compete directly rather than with different types of mutual funds. Moreover, Wermers (1999) found that the herding tendency of growth funds is larger than that of income funds because growth funds contain less information on the future income of investing stocks, which encourages growth funds to exhibit more herding behaviour. In practice, regulatory requirements, holding periods and competition faced by growth and international funds are stronger than those faced by other types of funds. Hence, the final objective of this paper is to test whether herding by UK mutual fund managers results - at least in part - due to non-informational reasons (such as reputation herding and characteristic herding) by examining whether these fund managers are more likely to follow similar types of funds. Moreover, we also examine whether the herding behaviour of growth-type funds is more pronounced than that of other types of funds and whether growth-type and international-type of funds are more likely to herd with similar types of funds than different types of funds.

1.7 This Paper's Contributions Relative to Previous Studies

Our contributions are as follows. First, in contrast to existing studies that focus on the static LSV herding measure, this paper extends the inter-temporal herding model of Sias (2004) to examine the lead-lag trades among UK fund managers in the stock markets. In particular, we can identify their cascades mainly from their own trades or other trades (i.e., herding). Second, we explore whether the short-selling restriction for mutual funds significantly diminishes the herding behaviours of fund managers during a bearish period, or whether the restriction simply reduces the expansion of their herding during a bearish period to sustain their herding in both bullish and bearish periods. In addition, this paper explores whether UK fund managers' herding is mainly informational in nature by testing their post-herding returns. Next, we explore the possible informational causes of UK fund managers' herding (such as investigative herding or information cascades) by testing the stocks with the largest and smallest capitalisation. Finally, we analyse whether non-informational reasons (i.e., characteristic herding and reputational herding) remain by testing whether fund managers are more likely to similar types of funds.

The remainder of this paper is structured as follows. Section 2 reports the dataset and the characteristics of UK mutual funds. Section 3 illustrates the methodology used herein, including in the examinations of UK fund managers' herding, of herding changes in bullish and bearish periods, of herding by value-relevant information (or not), and of informational and non-informational causes of herding. Section 4 analyses the empirical results of the related examinations. Section 5 concludes.

2. Data Scope and Analysis

The original data adopted by this study were derived from quarterly reports on holding individual stock returns, the number of outstanding stock companies, the capitalisation of British mutual funds from January 2002 to December 2009 from Thomson ONE Banker's ownership database (Thomson Reuters 2010)[1], and closing prices of listed stocks on the London Stock Exchange (LSE). The study divides funds into two types pursuant to the P/E ratios of the stocks held by the funds - aggressive and core growth funds and growth funds - and divides the funds into two types pursuant to market price-to-net value ratio: a GARP (i.e., growth at reasonable price) fund above a mean and a core value and deep value fund below a mean. Meanwhile, this study divides the funds pursuant to investment region: international funds and emerging market funds. In addition, this study also takes sector-specific funds as a research object. The fund type so selected is based on the turnover rate over an average standard among British mutual funds and focuses on analysing those funds featuring more liquid stocks. The British mutual fund types selected by the study are divided as follows: 18 aggressive and core growth funds, 32 growth funds, 23 core value and deep value funds, 12 GARP funds, 87 international funds, 28 emerging market funds, and 18 sector-specific funds.

[1] **Thomson Reuters.** 2010. Thomson ONE Banker. https://financial.thomsonreuters.com/en.html (accessed January 10, 2010).

Panel A of Table 1 reports the total market value of the assets held by the funds in the dataset at the end of each year of the sample period spanning from January 2002 to December 2009 and the total number of unique stocks held in those funds. The total holdings of UK-listed equities by higher turnover UK mutual funds was US$24,521 billion at year-end 2002 and US$91,464 billion at year-end 2009. The total number of unique stocks held in those funds was 3,916 at the end of 2002 and 9,936 at the end of 2009. Except for a slight decrease in the total assets of those funds in 2006 and 2007 - which might have resulted due to the impact from the onset of the subprime mortgage crisis - there was steady growth in the total assets of those funds and the total number of unique stocks held in those funds. Panel B records the average market value of the assets of each type of fund. The average size of all types of funds is US$398.70 million. Among those fund types, the average market value of assets held by the "aggressive growth and core growth" funds is the largest, at

Table 1 Descriptive Statistics of UK Mutual Funds

Year	2002	2003	2004	2005	2006	2007	2008	2009	Average
A. Total value and numbers of stock									
Totals assets of funds (billion US$)	24,520.94	37,689.01	34,230.35	69,509.03	60,097.45	61,065.46	71,141.85	91,463.99	56,214.76
Total unique stocks held	3,916	4,647	4,211	6,221	6,869	7,654	9,263	9,936	6,590
B. Average fund asset value (million US$)									
Aggres. gr. & core growth	794.06	1,014.87	895.96	879.37	590.47	519.64	804.00	996.82	811.90
GARP	155.51	171.39	138.74	133.33	149.17	149.24	131.43	158.70	148.44
Growth	477.39	646.97	538.86	779.37	300.30	281.58	290.91	851.60	520.87
Core value & deep value	407.43	394.62	388.70	524.21	475.84	513.64	475.84	500.03	460.04
International	172.84	176.77	180.30	195.99	235.84	214.50	215.57	195.58	198.42
Emerg. mkts.	264.38	406.16	425.51	507.77	394.55	429.93	379.96	561.28	421.19
Specific sector	206.75	198.94	229.65	269.59	232.94	250.95	224.17	227.53	230.06
C. Average number of stocks held									
Aggres. gr. & core growth	196	163	169	181	204	196	248	380	217
GARP	156	154	86	86	114	159	381	385	190
Growth	130	128	186	153	130	116	138	260	155
Core value & deep value	145	145	168	229	218	224	249	332	214
International	212	192	144	114	107	97	132	183	148
Emerg. mkts.	124	125	116	115	113	108	149	212	133
Specific sector	62	69	59	68	70	74	105	140	81

Source: The original data were derived from quarterly reports on holding individual stock returns, the number of outstanding stock companies, the capitalisation of British mutual funds from January 2002 to December 2009 from Thomson ONE Banker's ownership database (Thompson Reuters 2010).

US$811.90 million; the average value of assets held by "growth" funds is the second largest, at US$520.87 million. Panel C shows the average number of stocks that each type of fund holds in its portfolios. "Aggressive growth and core growth" type of funds hold the highest number of stocks, with an average of 217, the "core value and deep value" funds hold the second highest number of stocks, with an average of 214. In sum, UK mutual funds increased the number of stocks held in their portfolios over the period, particularly the "aggressive growth and core growth" and the "GARP" funds.

3. Methodology

3.1 Tests for Herding by UK Fund Managers

This study examines the cross-sectional correlation between some fund managers' trades in one period and other fund managers' trades in the next period. We follow Sias (2004) and calculate the raw fraction of the number of fund managers buying "security *i* during quarter *t*":

$$\text{Raw } \Delta_{i,t}^{n} = \text{No. of fund } buying_{i,t} / (\text{No. of fund } buying_{i,t} + \text{No. of fund } selling_{i,t}). \quad (1)$$

A fund manager is defined as a buyer if his ownership in a stock increases and as a seller if his ownership in a stock decreases during the quarter. Since the denominator is greater than zero, a security must have at least one fund manager trading it during the quarter. To allow for aggregation over time and to directly compare the coefficients of momentum trading and measures of fund managers' demand, we standardise the fraction of fund managers' buying security *i* in quarter *t* (denoted $\Delta_{i,t}$) as follows:

$$\Delta_{i,t} = \frac{\text{Raw}\Delta_{i,t} - \overline{\text{Raw } \Delta_t}}{\sigma(\text{Raw}\Delta_{i,t})}, \quad (2)$$

where $\overline{\text{Raw } \Delta_t}$ is the cross-sectional average (across *i* securities) raw fraction of fund managers buying in quarter *t* and $\sigma(\text{Raw}\Delta_{i,t})$ is the cross-sectional standard deviation (across *i* securities) of the raw fraction of fund managers buying in quarter *t*.

This study estimates a cross-sectional regression of the standardised fraction of fund managers buying security $i(\Delta_{i,t})$ in the current quarter on the standardised fraction of fund managers buying security *i* in the previous quarter $(\Delta_{i,t-1})$:

$$\Delta_{i,t} = \beta_1 \Delta_{i,t-1} + \varepsilon_{i,t}. \quad (3)$$

Sias (2004) proposed that the correlation between the current fraction and the lag fraction of fund managers buying can be decomposed as a fund manager following itself into and out of the same securities and other fund managers over adjacent periods; thus, we write the slope coefficient in Equation (3) as follows:

$$\beta_t = \rho\left(\Delta_{i,t}, \Delta_{i,t-1}\right) = \left\{1/(i-1)\sigma\left(\text{Raw}\Delta_{i,t}\right)\sigma\left(\text{Raw}\,\Delta_{i,t-1}\right) \times \sum_{i=1}^{I}\left[\sum_{n=1}^{N_{i,t}}\left(D_{n,i,t} - \overline{\text{Raw}\,\Delta_t}\right)\left(D_{n,i,t-1} - \overline{\text{Raw}\,\Delta_{t-1}}\right)/N_{i,t}N_{i,t-1}\right]\right\} + \left\{1/(i-1)\sigma\left(\text{Raw}\Delta_{i,t}\right)\sigma\left(\text{Raw}\,\Delta_{i,t-1}\right) \times \sum_{i=1}^{I}\left[\sum_{n=1}^{N_{i,t}}\sum_{m=1,m\neq n}^{N_{i,t-1}}\left(D_{n,i,t} - \overline{\text{Raw}\,\Delta_t}\right)\left(D_{m,i,t-1} - \overline{\text{Raw}\,\Delta_{t-1}}\right)/N_{i,t}N_{i,t-1}\right]\right\}. \quad (4)$$

If fund managers tend to follow their own trades over adjacent quarters, the first term on the right-hand side of Equation (4) will be positive. Alternatively, if fund managers tend to reverse their previous quarter's trades, the first term will be negative. If an individual fund manager's transactions in the quarter are independent of his own transactions, the first term will be zero. If manager *m* buys (sells) security *i* in quarter *t*-1 and manager *n* buys (sells) security *i* in quarter *t*, the second term will be positive. If fund managers tend to sell (buy) securities that other fund manager purchased (sold) over the previous quarter, this term will be negative. If fund managers' transactions in the quarter are independent of other fund managers' transactions in the previous quarter, this term will be zero.

3.2 UK Fund Managers' Herding Changes in Bullish and Bearish Markets

Due to the nature of the short-selling restriction for mutual funds, this study seeks to understand whether such a restriction significantly diminishes the herding behaviours of fund managers in a bearish market relative to a bullish market, whether their quick response to negative news in a bearish market will increase the significance of the herding behaviour during such a period, or whether the prohibition against short selling for mutual funds reduces the expansion of herding behaviour of fund managers in a bearish market period so as to create the significant and similar herding behaviour in either bullish or bearish markets. We use the determining criterion proposed by Frank J. Fabozzi and Jack C. Francis (1979), which posits that in a bullish market the stock price index rose for three consecutive months, and in a bearish market the stock price index dropped for three consecutive months. This study used the MSCI world index as the stock index since the majority of UK mutual funds in this study were international funds, which constitute 52% of all types of funds in the UK, as shown in Table 1. Thus, we can divide the total sample period into many sub-periods based on bullish or bearish periods. The criterion is the similarity of market changes because it is constructed by the weighted stock index. We separately compute these tests with the cross-sectional regressions for the entire sample of firms and for the sub-samples of firms within each capitalisation quintile to assess whether fund managers' herding changes during bullish and bearish periods. If the deposition components of fund managers' cascades exhibit stability in bullish and bearish periods, then the interpretations of their "herding" and "own cascades" will not change.

3.3 Herding by Value-Relevant Information or Not

To examine the relationships between UK fund managers' herding and future stock returns as a means of exploring whether fund managers' herding is informational or

non-informational in the stock market, this study uses a cross-sectional regression of the returns accruing to fund managers buying security i in the same and following quarter $j(R_{i,t+j})$ on the standardised fraction of fund managers buying security i in the current quarter $(\Delta_{i,t})$ as follows:

$$R_{i,t+j} = \beta_t \Delta_{i,t} + \varepsilon_{i,t}, j = 0,1,2,3,4,5 \, . \tag{5}$$

3.4 Informational Causes of Herding - Investigative Herding or Informational Cascades

We follow the hypothesis of Wermers (1999) and Sias (2004) that fund managers following others' trades tend to intensively trade in smaller stocks and that they following the correlated signals tend to intensively trade in larger stocks. If fund managers' herding primarily arises from informational cascades, herding should be strongest in small-capitalisation securities. Alternatively, if fund managers' herding primarily arises from investigative herding, herding should be strongest in large-capitalisation securities. Because the number of samples is not large in this study, computing the average "following their own trades" contribution and "herding" contribution for each security quarter is of limited value. Thus, we do not follow Sias (2004) in adjusting the average contribution from following their own trades and the trades of others, but we directly examine the cross-sectional correlation between the fraction of fund managers buying this quarter and the fraction buying last quarter for stocks within the small-, middle- and large-capitalisation quintiles. Through this procedure, we test whether there is evidence of managers following their own trades and herding within each capitalisation quintile.

3.5 Non-Informational Causes of Herding - Characteristic Herding and Reputational Concerns

Del Guercio (1996), Bennett, Sias, and Starks (2003) and Sias (2004) indicated that if characteristic herding or reputational concerns drove institutional herding, institutions are more likely to follow similar types of institutions rather than different types of institutions. We follow the procedure developed by Sias (2004) and regress the standardised fraction of growth funds bought this quarter on the standardised fraction of all types of funds bought last quarter. We limit the sample to securities with specific trade frequencies for which herding by growth-type funds resulted in their cascades this quarter and specific trade frequencies for which herding by all types of funds resulted in their cascades last quarter. We then replace the dependent variable with each type of fund and repeat the computational process.

$$\Delta_{i,t}^{q} = \beta_t^{q} \Delta_{i,t-1} + \varepsilon_{i,t} \, . \tag{6}$$

Since individual fund managers follow their own lag trades and the lag trades of other fund managers, the fraction of buyers for a specific fund class is related to the lag fraction of all fund buyers. The second term can be further decomposed into managers following other traders in the same fund classification and managers following traders belonging to a different fund class. For example, the correlation

among growth-type funds can be decomposed as follows. The first term in Equation (7) represents the portion of the correlation attributed to growth-type funds following their own lag trades. The second term represents the portion of the correlation attributed to growth-type funds following other growth-type funds. The last term represents the portion of the correlation attributed to growth-type funds following non-growth-type funds.

$$\begin{aligned}\beta_t^q = \rho\left(\Delta_{i,t}^q, \Delta_{i,t-1}\right) = \\ \left\{1/(i-1)\sigma\left(\mathrm{Raw}\Delta_{i,t}^q\right)\sigma\left(\mathrm{Raw}\ \Delta_{i,t-1}\right) \times \right. \\ \left.\sum_{i=1}^{I}\left[\sum_{q=1}^{Q_{i,t}}\left(D_{q,i,t} - \overline{\mathrm{Raw}\Delta_t^q}\right)\left(D_{q,i,t-1} - \overline{\mathrm{Raw}\ \Delta_{t-1}}\right)/Q_{i,t}N_{i,t-1}\right]\right\} + \\ \left\{1/(i-1)\sigma\left(\mathrm{Raw}\Delta_{i,t}^q\right)\sigma\left(\mathrm{Raw}\ \Delta_{i,t-1}\right) \times \right. \\ \left.\sum_{i=1}^{I}\left[\sum_{q=1}^{Q_{i,t}}\sum_{m=1,m\neq q,m\in B}^{Q_{i,t-1}}\left(D_{q,i,t} - \overline{\mathrm{Raw}\Delta_t^q}\right)\left(D_{m,i,t-1} - \overline{\mathrm{Raw}\ \Delta_{t-1}}\right)/Q_{i,t}N_{i,t-1}\right]\right\} + \\ \left\{1/(i-1)\sigma\left(\mathrm{Raw}\Delta_{i,t}^q\right)\sigma\left(\mathrm{Raw}\ \Delta_{i,t-1}\right) \times \right. \\ \left.\sum_{i=1}^{I}\left[\sum_{q=1}^{Q_{i,t}}\sum_{m=1,m\notin B}^{N_{i,t-1}-Q_{i,t-1}}\left(D_{q,i,t} - \overline{\mathrm{Raw}\Delta_t^q}\right)\left(D_{m,i,t-1} - \overline{\mathrm{Raw}\ \Delta_{t-1}}\right)/Q_{i,t}N_{i,t-1}\right]\right\},\end{aligned} \tag{7}$$

where $D_{q,i,t}$ is a dummy variable equal to one (zero) if growth-type fund manager q is a buyer (seller) of stock i in quarter t, and $Q_{i,t}$ is the number of growth-type fund managers trading stock i in quarter t. Similarly, $Q_{i,t-1}$ is defined for quarter t-1, and $N_{i,t-1} - Q_{i,t-1}$ is the number of non-growth fund managers trading stock i in quarter t-1. The decomposition includes the quarterly cross-sectional average of following the own trades of growth-type fund managers, following the trades of other growth-type fund managers (similar-type herding) and following the trades of non-growth-type fund managers (different-type herding).

4. Empirical Results

4.1 The Results of Testing the Herding of UK Fund Managers

The average coefficients of 31 regressions and associated t-statistics computed from the time-series standard errors in Equation (3) are reported in the first column of Table 2. Our results show significant evidence that UK fund managers follow other fund managers or themselves into and out of the same securities for all securities with ≥ 1, ≥ 5, ≥ 10 and ≥ 15 managers trading. Their cascading behaviours are significant on securities traded at all frequencies, which is consistent with the results of Sias (2004). However, no security had ≥ 20 managers trading over the sample period, which is possibly the result of little activity in relation to institutional trades, contrary to the scenario in the US.

Because of the standardised data and a single independent variable, the coefficients in the regressions of fund managers' demand on their lag demand are the correlations. The cross-sectional correlations between managers' demand this quarter and last quarter average 0.0630, 0.1405, 0.1621 and 0.2690 for securities with ≥ 1, ≥ 5, ≥ 10 and ≥ 15 managers trading, respectively. They all differ significantly from zero at the 1% level. Table 2 shows that, on average, the majority of the correlations (i.e., 0.0764/0.0630 for securities with ≥ 1 managers trading, 0.1424/0.1405

Table 2 Tests for Herding for Raw Fraction of Numbers - If Buyer Increased Position

Partitioned slope coefficient			Average R^2
Average coefficient (β)	Managers following their own trades	Managers following others' trades	
Panel A: Securities with ≥ 1 trader			
0.0630 (8.8247***)	-0.0133 (-2.5559**)	0.0764 (11.9785***)	0.5512%
Panel B: Securities with ≥ 5 traders			
0.1405 (9.6523***)	-0.0018 (-0.5130)	0.1424 (10.5643***)	2.6109%
Panel C: Securities with ≥ 10 traders			
0.1621 (4.5970***)	-0.0086 (-1.0927)	0.1708 (5.0901***)	6.3646%
Panel D: Securities with ≥ 15 traders			
0.2690 (4.1512***)	-0.0017 (-0.1288)	0.2708 (3.8361***)	18.5854%

Notes: Numbers in ( ) indicate *t*-statistics. ***, ** and * indicate statistical significance at the 1, 5 and 10 per cent levels, respectively.

Source: Authors' calculation.

for securities with ≥ 5 managers trading, 0.1708/0.1621 for securities with ≥ 10 managers trading, 0.2708/0.2690 for securities with ≥ 15 managers trading) between the fraction of fund managers buying this quarter and the fraction buying last quarter in the stock market results from other fund managers' cascades (i.e., herding), which is statistically significant at the 1% level. Own cascades account for an obvious minority of the correlation (i.e., -0.0133/0.0630 for securities with ≥ 1 managers trading, -0.0018/0.1405 for securities with ≥ 5 managers trading, -0.0086/0.1621 for securities with ≥ 10 managers trading, -0.0017/0.2690 for securities with ≥ 15 managers trading) between the fraction of fund managers buying this quarter and the fraction buying last quarter. We find that individual fund managers continue to buy (sell) the securities they sold (bought) the previous quarter, which negatively reaches statistical significance only for securities with ≥ 1 managers trading. Thus, the empirical results show that UK fund managers' cascades mainly result from their herding, which is consistent with the findings of Sias (2004).

4.2 The Results of Herding Changes in Bullish and Bearish Markets

We also limit the sample to securities with ≥ 5 trades because the sample distribution is uniform only for trading frequency. Panel A of Table 3 shows the average correlations and decompositions of own and other cascades for the entire sample in the bullish and bearish periods and an *F*-statistic with the null hypothesis that the time-series mean in the bullish period equals that in the bearish period. The results consistently indicate that we accept the hypothesis that the correlation for the entire sample is the same during bullish and bearish periods. Moreover, we demonstrate that fund managers' herding is significantly larger than their own cascades, and this phenomenon will not change during a bullish or bearish period. We then compute the

Table 3 Average Coefficients for Following UK Fund Managers' Own Trades and Others' Trades for the Bullish and Bearish Periods - For Securities with ≥ 5 traders

	Partitioned slope coefficient			*F*-value (Prob)
	Average efficient	Managers following their own trades	Managers following others' trades	
Panel A: The entire sample for the bullish and bearish periods				
Bullish period	0.016	-0.0398	0.0558	27.8334
	(0.8683)	(-5.6253***)	(3.3449***)	[0.0000]
Bearish period	0. 0325	-0.0322	0.0647	9.1899
	(1.0813)	(-1.9200*)	(2.3776***)	[0.0079]
F-statistic	0.2314	0.2452	0.0827	
[*p*-value]	[0.6342]	[0.6243]	[0.7759]	
Panel B: Each capitalization quintile				
Small firms				
Bullish period	0.0045	-0.0472	0.0516	2.1261
	(0.0729)	(-1.4555)	(0.7659)	[0.1642]
Bearish period	0.0534	-0.0527	0.1061	1.7446
	(0.4822)	(-1.5992)	(1.0117)	[0.1941]
F-statistic	0.1723	0.0110	0.1939	
[*p*-value]	[0.6812]	[0.9185]	[0.6630]	
Quintile 2				
Bullish period	-0.0205	-0.0399	0.0194	2.1402
	(-0.5123)	(-3.2608***)	(0.5017)	[0.1513]
Bearish period	-0.0019	-0.0464	0.0445	0.5616
	(-0.0172)	(-1.8680*)	(0.3749)	[0.4645]
F-statistic	0.0397	0.0706	0.0681	
[*p*-value]	[0.8434]	[0.7923]	[0.7960]	
Large firms				
Bullish period	0.0209	-0.0389	0.0598	36.3259
	(1.3940)	(-5.1543***)	(4.1157***)	[0.0000]
Bearish period	0.0280	-0.0299	0.0579	8.2321
	(0.9752)	(-1.7383*)	(2.3058**)	[0.0107]
F-statistic	0.0574	0.3175	0.0048	
[*p*-value]	[0.8124]	[0.5776]	[0.9452]	

Notes: Numbers in ( ) indicate *t*-statistics and numbers in [ ] indicate *p*-values. ***, ** and * indicate statistical significance at the 1, 5 and 10 per cent levels, respectively.

Source: Authors' calculation.

average correlations and decompositions for each bullish, bearish and capitalisation quintile to combine these results with the results across capitalisation quintiles. Except for the *F*-statistics for testing the equality of the time series mean for own and other cascades, each capitalisation quintile also reports the *F*-statistics with the null hypothesis that the time-series mean in the bullish sub-period equals that in the bearish sub-period. The results in Panel B of Table 3 show no significant differences between the bullish and bearish periods for average own cascades and herding in all quintiles. Our results find that UK fund managers' herding is significant in both bullish and bearish stock markets, which coincides with the result found by Hwang and Salmon (2004). This finding is possibly because the nature of the short-selling restriction for mutual funds reduces the expansion of herding by fund managers during the bearish period due to their quick response to negative news. Meanwhile, fund managers' herding is larger than their own cascades, which is the same during both

bullish and bearish markets. In addition, by examining the *F*-statistics, UK fund managers' cascades mainly result from their herding for the largest capitalisation securities in both bullish and bearish periods.

4.3 The Results of Herding by Value-Relevant Information (or Not)

Table 4 shows the results of post-herding returns of UK mutual funds and separate fund-type managers. On the whole, there are weak positive correlations between the fraction of fund managers buying and stock returns within the following year regardless of whether entire or separate funds are considered. Thus, the results in Table 4 are consistent with the findings of Choe, Kho, and Stulz (1999), Wermers (1999) and Sias (2004). In other words, the herding behaviours of UK fund managers are based on value-relevant information, as proposed by Hung, Lu, and Lee (2010), but such informational herding is within the following year. Our result resembles that of Sias (2004) for the US, but the persistent period of UK fund managers' herding is longer than that of US fund managers' herding, possibly for the following two reasons. The first may be that volatility in the UK stock market is significantly lower than in the US stock market since the ratio of FDI/GDP (i.e., foreign direct investment occupying gross domestic product) in the UK is obviously lower than in the US[2]. The other reason may be that interest rates in the UK have been higher than in the US in recent years, making the reinvestment yield of cash dividends in the UK higher than in the US when the holding period increases. In sum, we find no evidence that UK fund managers' herding drives prices away from fundamental values, which is in opposition to the findings from Dennis and Weston (2000), Chakravarty (2001) and Sias, Starks, and Titman (2002).

Moreover, regardless of entire or separate funds, we consistently find insignificant relations between the fraction of fund managers buying and returns in the following five quarters for all samples with at least 1, 5, 10 and 15 traders. In other words, compared with the herding quarter and the following one to four quarters, the correlation in the following five quarters consistently decreases. Hence, the impact of such informational herding is consistently reversed over the following five quarters. On average, the largest relation occurs in the following year for samples with at least 15 traders, possibly because of higher liquidity in the stock market. More specifically, post-herding returns for growth-type funds are the largest, those for specific-sector funds are the second largest and those for international-type funds are the third largest. Thus, other investors in the stock market could follow UK fund managers and purchase overbought stocks with at least 15 traders quarterly in the following year, particularly for growth-type, specific-sector and international-type funds, to improve portfolio performance.

[2] The main investing region of UK mutual funds is the UK stock market, and the main investing region of US mutual funds is the US stock market.

Table 4 Tests for Correlation between UK Fund Managers' Demand and the Same and Following Returns $R_{i,t+j} = \beta_t \Delta_{i,t} + \varepsilon_{i,t}, j = 0,1,2,3,4,5$

	Same quarter return	Following 2 quarter return	Following 3 quarter return	Following 4 quarter return	Following 5 quarter return
Panel A: The entire sample					
Securities with ≥ 1 trader	0.0103	0.0091	0.0120	0.0114	-0.0363
	(5.3289***)	(1.9974***)	(2.6441***)	(2.3098***)	(-1.0541)
Securities with ≥ 5 traders	0.0130	0.0048	0.0000	-0.0018	0.0000
	(2.0227***)	(0.3602)	(0.0067)	(-0.1085)	(0.0375)
Securities with ≥ 10 traders	0.0209	0.0215	0.0272	0.0260	0.0054
	(4.3439***)	(3.5294***)	(3.7140***)	(2.4265***)	(1.1017)
Securities with ≥ 15 traders	0.0187	0.0353	0.0375	0.0377	0.0019
	(2.6547***)	(3.6973***)	(3.7067***)	(2.7851***)	(0.2295)
Panel B: Aggres. and core growth					
Securities with ≥ 1 trader	0.0131	0.0051	-0.0004	-0.0057	-0.0029
	(3.2260***)	(0.8060)	(-0.0589)	(-0.7343)	(-0.6155)
Securities with ≥ 5 traders	0.0193	0.0159	0.0129	0.0137	-0.0000
	(2.2065***)	(1.1854)	(0.8557)	(0.8240)	(-0.1476)
Securities with ≥ 10 traders	0.0198	0.0212	0.0295	0.0306	0.0061
	(4.0790***)	(2.9821***)	(3.0829***	(2.6375***)	(1.1673)
Securities with ≥ 15 traders	0.0204	0.0396	0.0460	0.0516	0.0000
	(2.6347***)	(3.4802***)	(3.2202***)	(3.2202***)	(0.0443)
Panel C: GARP					
Securities with ≥ 1 trader	0.0067	-0.0039	0.0014	0.0099	0.0043
	(1.0243)	(-0.3156)	(0.1025)	(0.8277)	(1.0365)
Securities with ≥ 5 traders	0.0114	-0.0136	-0.0267	-0.0285	-0.0000
	(1.1508)	(-0.6079)	(-1.1018)	(-1.0600)	(-0.1384)
Securities with ≥ 10 traders	0.0235	0.0251	0.0347	0.0356	0.0025
	(4.0046***)	(2.6417***)	(2.5627***)	(2.3882***)	(0.4278)
Securities with ≥ 15 trader	0.0172	0.0286	0.0315	0.0481	0.0046
	(1.3106)	(1.9315**)	(2.0606***)	(3.0067***)	(0.5349)
Panel D: Growth					
Securities with ≥ 1trader	0.0081	0.0034	0.0062	0.0000	-0.0024
	(1.4333)	(0.2910)	(0.5040)	(0.0255)	(-0.6136)
Securities with ≥ 5 traders	0.0132	-0.0007	-0.0033	-0.0059	-0.0018
	(1.1992)	(-0.0297)	(-0.1223)	(-0.1979)	(-0.3223)
Securities with ≥ 10 traders	0.0218	0.0280	0.0357	0.0327	0.0072
	(4.0293***)	(4.0336***)	(3.8377***)	(2.6241***)	(1.4653)
Securities with ≥ 15traders	0.0195	0.0425	0.0499	0.0589	-0.0017
	(2.2629***)	(4.4063***)	(3.2528***)	(2.8274***)	(-0.1946)
Panel E: Core and deep value					
Securities with ≥ 1 trader	0.0184	0.0159	0.0169	0.0150	0.0000
	(4.0062***)	(2.1977***)	(2.1308***)	(1.5002)	(0.2016)
Securities with ≥ 5 traders	0.0154	0.0133	0.0125	0.0157	0.0011
	(2.1933***)	(0.9981)	(0.8206)	(0.8753)	(0.3332)
Securities with ≥ 10 traders	0.0186	0.0148	0.0221	0.0231	0.0051
	(3.1478***)	(1.1122)	(1.3181)	(1.2502)	(0.9843)
Securities with ≥ 15 traders	0.0224	0.0385	0.0375	0.0414	0.0030
	(3.0966***)	(3.4888***)	(3.3188***)	(2.8343***)	(0.2942)

Panel F: International					
Securities with ≥ 1 trader	0.0154	0.0137	0.0131	0.0096	-0.0038
	(3.0449***)	(1.7282***)	(1.4526)	(0.9013)	(-0.8241)
Securities with ≥ 5 traders	0.0182	0.0142	0.0163	0.0167	0.0034
	(2.4295***)	(1.0706)	(1.1214)	(1.0044)	(0.6405)
Securities with ≥ 10 traders	0.0215	0.0235	0.0357	0.0361	0.0060
	(1.6820)	(2.9521***)	(3.5424***)	(3.1385***)	(0.9461)
Securities with ≥ 15 traders	0.0161	0.0326	0.0428	0.0518	0.0089
	(1.6820)	(2.9521***)	(3.5424***)	(3.1385***)	(0.9461)
Panel G: Emerg. mkts					
Securities with ≥ 1 trader	0.0245	0.0216	0.0093	-0.0121	0.0090
	(3.6029***)	(1.7750**)	(0.6890)	(-0.7248)	(1.1264)
Securities with ≥ 5 traders	0.0208	0.0141	0.0098	-0.0056	0.0034
	(3.9617***)	(1.2101)	(0.6802)	(-0.2843)	(0.3638)
Securities with ≥ 10 traders	0.0263	0.0096	0.0014	-0.0028	0.0183
	(2.1193***)	(0.5429)	(0.0698)	(-0.0976)	(1.5945)
Securities with ≥ 15 traders	0.0549	0.0619	0.0202	0.0014	0.0092
	(2.2805***)	(1.5931)	(0.3992)	(0.0219)	(0.3971)
Panel H: Specific sector					
Securities with ≥ 1 trader	0.0130	0.0186	0.0222	0.0228	-0.0018
	(3.2162***)	(3.7277***)	(3.6903***)	(3.2279***)	(-0.3706)
Securities with ≥ 5 traders	0.0090	0.0079	0.0043	0.0088	-0.0000
	(1.0149)	(0.8946)	(0.4779)	(0.7296)	(-0.0859)
Securities with ≥ 10 traders	0.0072	-0.0506	-0.0437	-0.0325	0.0011
	(0.2712)	(-0.5775)	(-0.4867)	(-0.4022)	(0.0843)
Securities with ≥ 15 traders	0.0460	0.0518	0.0343	0.0576	0.0099
	(2.1039***)	(1.5510)	(1.0456)	(1.6030*)	(0.9104)

Notes: Numbers in ( ) indicate the *t*-statistics, and numbers in [ ] indicate the *p*-values. ***, ** and * indicate statistical significance at the 1, 5 and 10 percent levels respectively.

Source: Authors' calculation.

4.4 The Results of Informational Causes of Herding

Because the capitalisation distribution is extreme except for securities with ≥ 5 trades, Table 5 reports the time-series averages of the 31 cross-sectional averages and associated *t*-statistics for securities within each capitalisation quintile for only those securities with ≥ 5 trading frequency. The second columns in Table 5 show that the average following-their-own trades are significantly negative for both small and large-capitalisation quintiles. Consistent with Sias (2004), we find that UK fund managers are more likely to negatively follow their own prior-quarter trades in small securities, which is consistent with the hypothesis that institutions following their own lag trades may be based on the adjustment stock positions and trading costs. By contrast, the results in the third column provide significantly positive evidence of managers following other managers' trades only for the large-capitalisation quintile. Thus, contrary to the result of Sias (2004), UK fund managers are more likely to herd in large-capitalisation securities than in small-capitalisation securities. This finding is consistent with the hypothesis of Scharfstein and Stein (1992) and Hirshleifer, Subrahmanyam, and Titman (1994), which is that institutional herding results primarily from cross-sectional correlation indicators, possibly as a result of their follow-

Table 5 Average Coefficients from Following UK Fund Managers' Own Trades and Others' Trades for Securities with ≥ 5 Traders

	Partitioned slope coefficient			
Capitalization quintile	**Average coefficient (β)**	**Managers following their own trades**	**Managers following others' trades**	**Average R^2**
Small firms	0.0191	-0.0488	0.0679	0.8271%
	(0.3594)	(-2.0304**)	(1.2158)	
Quintile 2	-0.0149	-0.0418	0.0269	0.5155%
	(-0.3544)	(-3.7630***)	(0.6188)	
Large firms	0.0230	-0.0361	0.0592	5.7030%
	(1.7278*)	(-4.9934***)	(4.7709***)	

Notes: Numbers in ( ) indicate the *t*-statistics. ***, ** and * indicate statistical significance at the 1, 5 and 10 percent levels respectively.

Source: Authors' calculation.

ing the same signals. In other words, the main cause of UK fund managers' herding may come from investigative herding rather than informational cascades in the stock market. Meanwhile, this is not a monotonic positive relation between the average herding item and capitalisation. Moreover, given the positive evidence from post-herding returns, our analysis suggests that such investigative herding is rational.

4.5 The Results of Non-Informational Causes of Herding

By limiting the sample to securities with ≥ 5 trades resulting from the uniformity of the sample distribution only for this trading frequency, we compute the time-series averages and associated *t*-statistics of the cross-sectional averages for aggressive and core growth, GARP and growth funds (we denote these afterward as growth-type funds) based on the P/E or M/B ratio in the first row in Panel A of Table 6. The same averages and statistics of core and deep values (we denote afterward as value-type funds) are reported in the second row. The third row reports *F*-statistics on the null hypothesis that the estimates are equal across fund types. The analysis is then repeated for mutual funds based on investing regions and sector-specific or non-sector-specific in Panels B and C of Table 6, respectively. The last column of Table 6 reports *F*-statistics on the null hypothesis that the estimates between same-type and different-type herding are equal for each type of UK mutual fund in this study.

In the last row in Panel C of Table 6, we reject the null hypothesis of equality across fund types based on sector-specific or non-sector-specific for the average own trades. We find that sector-specific funds negatively follow their own lag trades more often than non-sector-specific funds, perhaps as a result of sector-specific funds adjusting for past stock positions. In addition, in the last row of Panel A of Table 6, we reject the null hypothesis of equality for the average herding. We find that UK growth-type funds will herd significantly more often than non-growth-type funds, which is consistent with the finding of Wermers (1999). Moreover, in the last column of Panels A and B of Table 6, we reject the null hypothesis of equality for the average same-type and different-type herding for growth-, international- and value-type funds. In detail, the growth-type and international-type funds are more likely to follow similar types of funds, but the value-type funds are more likely to follow different types of funds. Our results for the three types of funds coincide with assumptions

Table 6 Average Coefficients from Following UK Fund Managers' Own Trades, Herding, Same-Type Herding and Different-Type Herding for Securities with ≥ 5 Traders

Trader type	Average coefficient (β)	Following own trades	Following others' trades	Same type	Different type	Average R^2	*F*-value (Prob)
Panel A: Based on P/E or M/B ratio							
Aggres. and core growth & GARP & Growth	0.0508 (2.6360**)	-0.0317 (-2.3978**)	0.0675 (3.9029***)	0.0803 (2.1168**)	0.0195 (1.7672**)	0.47%	3.0797 [0.084]
Core and deep value	0.0177 (0.4279)	-0.0167 (-2.3528**)	0.0193 (1.7401*)	0.0068 (2.4235**)	0.0607 (3.4572***)	1.37%	9.1799 [0.004]
F-value [Prob]	3.8941 [0.053]	0.1086 [0.743]	5.5165 [0.022]	3.8622 [0.054]	3.9358 [0.052]		
Panel B: Based on investing regions							
International	0.0415 (2.9885***)	-0.0325 (-4.3133***)	0.0740 (6.6651***)	0.975 (9.9429***)	0.0565 (6.8202***)	0.75%	14.5868 [0.000]
Emerg. mkts.	0.0808 (4.4860***)	-0.0179 (-2.9956***)	0.0986 (5.8573***)	0.0581 (5.0990***)	0.0405 (3.0877***)	1.63%	1.0297 [0.314]
F-value [Prob]	2.9444 [0.089]	2.3370 [0.132]	1.4927 [0.227]	9.9705 [0.003]	1.0602 [0.095]		
Panel C: Based on specific sector or not							
Specific sector	0.0233 (1.1938)	-0.0146 (-1.7914*)	0.0380 (2.1983***)	0.0058 (0.8944)	0.0321 (1.8775*)	1.20% 0.74%	2.0697 [0.155]
Non-specific Sector *F*-value [Prob]	0.0612 (5.3669***) 2.6969 [0.106]	0.0027 (1.0458) 3.8785 [0.054]	0.0584 (5.2676***) 0.9673 [0.329]	0.0218 (3.2208***) 2543.77 [0.093]	0.0366 (3.9677***) 0.0510 [0.822]		1.6746 [0.201]

Notes: Numbers in ( ) indicate the *t*-statistics, and numbers in [ ] indicate the *p*-values. ***, ** and * indicate statistical significance at the 1, 5 and 10 percent levels respectively.

Source: Authors' calculation.

regarding characteristic herding (Del Guercio 1996; Bennett, Sias, and Starks 2003; Sias 2004) and concerns regarding reputational herding (Scharfstein and Stein 1990; Trueman 1994; Sias 2004). Characteristic herding may occur because the investing targets of growth-type funds are companies with long-term increases in stock prices and the investing targets of international-type funds are regions with possible increases and dispersed risk in stock prices. Moreover, the reasons for reputational herding may be the strong competition faced by these funds in the stock market. Alternatively, value-type funds are more likely to herd with different types of funds (i.e., growth-type funds), possibly due to the leadership of growth-type funds.

5. Conclusion

In contrast with the adjusted LSV measure of Wylie (2005), this paper first extends the dynamic model of Sias (2004) to explore whether the herding behaviour of UK fund managers is significant in the stock market. Our results demonstrate that their cascading behaviour is significant for securities with ≥ 1, ≥ 5, ≥ 10 and ≥ 15 traders. UK fund managers' cascades mainly result from their herding. Then, combining the results for the entire sample and each capitalisation quintile of bullish and bearish quintiles, our results show that fund managers are engaged in herding behaviour in both bullish and bearish stock markets, possibly because the prohibition against short selling for mutual funds reduces the expansion of their herding behaviours in a bearish market period as a result of their quick response to negative news.

Regardless of entire or separate funds, we demonstrate that there are weak positive correlations between the fraction of fund managers buying and subsequent stock returns. Thus, UK fund managers' herding is mainly driven by value-relevant information, but informational herding occurs during the next year. We find that the persistent period of UK fund managers' herding is longer than that of US fund managers' herding. Most importantly, to improve their portfolio performance, other investors in the stock market could follow fund managers and purchase stocks overbought by them with at least 15 traders quarterly in the following year, particularly for growth-type, sector-specific and international-type funds.

Next, fund managers are more likely to herd in large-capitalisation securities, possibly because they are following the cross-sectional correlation signals. Hence, UK fund managers' herding may result from investigative herding rather than informational cascades in the stock market. Moreover, we find that growth-type and international-type funds in the UK are more likely to herd with similar-type funds, possibly because of characteristic herding and reputational concerns, which demonstrates the existence of non-informational herding. However, value-type funds are more likely to herd with different types of funds, possibly because of the leadership of growth-type funds. Our results demonstrate that the tendency to herd is influenced by the different environments faced by these investors.

References

Banerjee, Abhijit V. 1992. "A Simple Model of Herd Behavior." *Quarterly Journal of Economics*, 107(3): 797-817. http://dx.doi.org/10.2307/2118364

Bennett, James A., Richard W. Sias, and Laura T. Starks. 2003. "Greener Pastures and the Impact of Dynamic Institutional Preferences." *Review of Financial Studies*, 16(4): 1203-1238.

Bikhchandani, Sushil, David Hirshleifer, and Ivo Welch. 1992. "A Theory of Fads, Fashion, Custom, and Cultural Change as Informational Cascades." *Journal of Portfolio Economy*, 100(5): 992-1026. http://dx.doi.org/10.1086/261849

Chakravarty, Sugato. 2001. "Stealth Trading: Which Traders' Trades Move Prices?" *Journal of Financial Economics*, 61(2): 289-307. http://dx.doi.org/10.1016/S0304-405X(01)00063-0

Chang, Eric C., Joseph W. Cheng, and Ajya Khorana. 2000. "An Examination of Herd Behavior in Equity Markets: An International Perspective." *Journal of Banking and Finance*, 24(10): 1651-1679. http://dx.doi.org/10.1016/S0378-4266(99)00096-5

Chiang, Thomas C., Tan Lin, Jiandong Li, and Edward Nelling. 2013. "Dynamic Herding Behavior in Pacific-Basin Markets: Evidence and Implications." *Multinational Finance Journal*, 17(3/4): 149-163. http://dx.doi.org/10.17578/17-3/4-3

Choe, Hyuk, Bong-Chan Kho, and René M. Stulz. 1999. "Do Foreign Investors Destabilize Stock Markets? The Korean Experience in 1997." *Journal of Financial Economics*, 54: 227-264. http://dx.doi.org/10.1016/S0304-405X(99)00037-9

Del Guercio, Diane. 1996. "The Distorting Effect of the Prudent-Man Laws on Institutional Equity Investment." *Journal of Financial Economics*, 40: 31-62. http://dx.doi.org/10.1016/0304-405X(95)00841-2

De Long, Bradford J., Andrei Shleifer, Lawrence H. Summers, and Robert J. Waldmann. 1990. "Positive Feedback Investment Strategies and Destabilizing Rational Speculation." *Journal of Finance*, 45(2): 379-396. http://dx.doi.org/10.1111/j.1540-6261.1990.tb03695.x

Demirer, Riza, Ali M. Kutan, and Chun-Da Chen. 2010. "Do Investors Herd in Emerging Stock Markets? Evidence from the Taiwanese Market." *Journal of Economic Behavior and Organization*, 76(2): 283-295.

Dennis, Patrick J., and James Weston. 2000. "Who's Informed? An Analysis of Stock Ownership and Informed Trading." https://gates.comm.virginia.edu/pjd9v/paper_informedtrading.pdf.

Economou, Fotini, Alexandros Kostakis, and Nikolaos Philippasa. 2011. "Cross-Country Effects in Herding Behavior: Evidence from the Four South European Markets." *Journal of International Financial Markets, Institutions & Money*, 21: 443-460. http://dx.doi.org/10.1016/j.intfin.2011.01.005

Fabozzi, Frank J., and Jack C. Francis. 1979. "Mutual Fund Systematic Risk for Bull and Bear Markets: An Empirical Examination." *Journal of Finance*, 34: 1250-1254. http://dx.doi.org/10.1111/j.1540-6261.1979.tb00069.x

Fang, Hao, Yang-Cheng Lu, Hwey-Yun Yau, and Yen-Hsien Lee. 2013. "Stock Characteristics Herded by Foreign Investors with Higher Abnormal Returns in the Taiwan Stock Market." *Romanian Journal of Economic Forecasting*, 16(4): 232-245.

Fang, Hao, Yang-Cheng Lu, and Hwey-Yun Yau. 2014. "The Effects of Stock Characteristics on the Direction and Extent of Herding by Foreign Institutional

Investors in the Taiwan Stock Exchange." *Emerging Markets Finance and Trade*, 50(2): 60-74.

Froot, Kenneth A., David S. Scharfstein, and Jeremy C. Stein. 1992. "Herd on the Street: Informational Inefficiencies in a Market with Short-Term Speculation." *Journal of Finance*, 47(4): 1461-1484. http://dx.doi.org/10.1111/j.1540-6261.1992.tb04665.x

Gleason, Kimberly C., Ike Mathur, and Mark A. Peterson. 2004. "Analysis of Intraday Herding Behavior among the Sector ETFs." *Journal of Empirical Finance*, 11(5): 681-694. http://dx.doi.org/10.1016/j.jempfin.2003.06.003

Grinblatt, Mark, Sheridan Titman, and Russ Wermers. 1995. "Momentum Investment Strategies, Portfolio Performance, and Herding: A Study of Mutual Fund Behavior." *American Economic Review*, 85(5): 1088-1105.

Gür, Timur Han, Naci Canpolat, and Hüseyin Özel. 2011. "The Crisis and After: There Is No Alternative?" *Panoeconomicus*, 58(1): 113-133. http://dx.doi.org/10.2298/PAN1101113G

Hirshleifer, David S., Avanidhar Subrahmanyam, and Sheridan Titman. 1994. "Security Analysis and Trading Patterns when Some Investors Receive Information before Others." *Journal of Finance*, 49(5): 1665-1698. http://dx.doi.org/10.1111/j.1540-6261.1994.tb04777.x

Hung, Wei-Feng, Chia-Chi Lu, and Cheng F. Lee. 2010. "Mutual Fund Herding Its Impact on Stock Market: Evidence from the Taiwan Stock Market." *Pacific-Basin Finance Journal*, 18(5): 477-493.

Hwang, Soosung, and Mark Salmon. 2004. "Market Stress and Herding." *Journal of Empirical Finance*, 11(4): 585-616. http://dx.doi.org/10.1016/j.jempfin.2004.04.003

Kremer, Stephanie, and Dieter Nautz. 2013. "Causes and Consequences of Short-Term Institutional Herding." *Journal of Banking and Finance*, 37(5): 1676-1686. http://dx.doi.org/10.1016/j.jbankfin.2012.12.006

Lakonishok, Josef, Andrei Shleifer, and Robert W. Vishny. 1992. "The Impact of Institutional Trading on Stock Prices." *Journal of Financial Economics*, 32(1): 23-43. http://dx.doi.org/10.1016/0304-405X(92)90023-Q

Liao, Tsai-King, Chin-Jen Huang, and Chien-Yuan Wu. 2011. "Do Fund Managers Herd to Counter Investor Sentiment?" *Journal of Business Research*, 64(2): 207-212.

Lu, Yang-Cheng, Hao Fang, and Chien-Cheng Nieh. 2012. "The Price Impact of Foreign Institutional Herding of Large-Size Stocks in the Taiwan Stock Market." *Review of Quantitative Finance and Accounting*, 39(2): 189-208.

Scharfstein, David S., and Jemery C. Stein. 1990. "Herd Behavior and Investment." *American Economic Review*, 80(3): 465-479.

Sias, Richard W., Laura T. Starks, and Sheridan Titman. 2002. "The Price Impact of Institutional Trading." https://www.researchgate.net/publication/228316877_The_Price_Impact_Of_Institutional_Trading.

Sias, Richard W. 2004. "Institutional Herding." *The Review of Financial Studies*, 17(1): 165-206.

Trueman, Brett. 1994. "Analyst Forecasts and Herding Behavior." *The Review of Financial Studies*, 7(1): 97-124. http://dx.doi.org/10.1093/rfs/7.1.97

Walter, Andreas, and Friedrich M. Weber. 2006. "Herding in the German Mutual Fund Industry." *European Financial Management*, 12(3): 375-406. http://dx.doi.org/10.1111/j.1354-7798.2006.00325.x

Wermers, Russ. 1999. "Mutual Fund Herding and the Impact on Stock Prices." *Journal of Finance*, 54(2): 581-622. http://dx.doi.org/10.1111/0022-1082.00118

Wylie, Sam. 2005. "Fund Manager Herding: A Test of the Accuracy of Empirical Results Using U.K. Data." *Journal of Business*, 78(1): 381-403.